

Remarks/Arguments:

Claims 6-17 stand rejected. Claim 18 is newly added.

Applicants thank the Examiner for the opportunity to discuss the claims with him on September 28, 2004, and for his helpful suggestions.

Election/Restrictions:

Claims 1-5 have been withdrawn.

Specification:

Applicants have now corrected "Baum-Welsch" to -- Baum-Welch --.

Drawings:

Applicants have amended FIG. 1, so that it corresponds to the correction of "Baum-Welch". Applicants will provide formal drawings upon indication of allowable subject matter.

Claim Objections:

Claim 7 has been corrected to recite "Baum-Welch". Claim 14 has been cancelled.

Section 103 Rejections:

Claims 6-9 have been rejected as being obvious in view of Vysotsky and Kuhn. Applicants respectfully submit that these rejections are overcome for the reasons set forth below.

Amended claim 6 now includes features which are not suggested by the cited references, namely:

- causing the known speaker to **enroll by uttering from a vocabulary a predetermined number of combined words, each word indicative of a number between one to nine and at least one bridging word "ti";**
- adapting parameters of a set of word models for the combined words based upon input speech data to provide adapted word models,
- concatenating the adapted word models to create an enrollment feature vector indicative of the enrollment data. . .
- . . . **the test feature vector is based on extracting the same predetermined number of combined words in the test speech data, where each word is indicative of the same number between one to nine and at least the same bridging word "ti".**

Claim 6 has been amended so that it includes the features of claim 10 (now cancelled) and clearly distinguishes between an enrollment feature vector and a test feature vector.

As may be seen, for example, in FIG. 3, the enrollment data is data obtained from a known speaker and test data is data obtained from an unknown speaker whose identity is being determined. The enrollment data includes a vocabulary of a predetermined number of combined words, where each word is indicative of a number between 1 to 9 and at least one bridging word "ti". More specifically, as shown in FIG. 3, the predetermined number of combined words includes 9, 6, 7, 4 and ti. By adapting parameters of a set of word models for the combined words based upon input speech data adapted word models are provided. The adapted word models are then concatenated to create an enrollment feature vector, which is indicative of the enrollment data.

When test speech data is input to the system, the test speech data is converted to a fixed length test feature vector that is independent of the order of words spoken or the speaking rate. As recited in claim 6, the **test feature vector is based on extracting the same predetermined number of combined words, where each word is indicative of the same number between 1 to 9 and at least the same bridging word "ti"**. As shown in FIG. 3, for example, the test data is reordered, so that it includes the same combined words and the same bridging word. From the adapted word model, a fixed test feature vector is obtained. The test feature vector and the enrollment feature vector are compared to each other and, based on a computed weighted Euclidean distance, a determination is made as to whether the test data is the same as the enrollment data.

The Office Action states that Vysotsky discloses all the features of claim 6, except converting variable input to fixed length feature vectors that are independent of the order of words spoken or the speaking rate. The Office Action, however, states that Kuhn discloses the claimed fixed length feature vector. Applicants respectfully submit that Kuhn merely describes a super vector that represents an adapted model that is populated with values. Kuhn does **not** suggest that this super vector is **independent of the order of words spoken or of the speaking rate**.

Independence is an important advantage of the invention, because, as recited, the invention **extracts the same predetermined number of combined words in the test speech data as the predetermined number of combined words of the enrollment data, where each word is indicative of the same number between one to nine and at least the same bridging word "ti"**.

Kuhn does **not** suggest a combination of an enrollment feature vector and a test feature vector **where the enrollment feature vector originates from a predetermined number of combined words**, where each word is indicative of a number between 1 to 9 and at least one bridging word "ti". Furthermore, Kuhn does **not** suggest forming a test feature vector by extracting **the same predetermined number of combined words from a test speech data, where each word is indicative of the same number between 1 to 9 and at least the same bridging word "ti"**.

Favorable reconsideration is requested for amended claim 6. Dependent claims 7-9, 11-12 and 15-17, each depend from amended claim 6 and are, therefore, not subject to rejection in view of the cited references for at least the same reasons set forth for amended claim 6. Favorable reconsideration is respectfully requested.

Newly Added Claim 18:

Newly added claim 18 includes features not suggested either singularly or in combination by the cited references, namely:

- forming enrollment speech data as a **first plurality of pair-phrases** using a set of words, the set of words consisting of a **predetermined number** of words;
- forming test speech data as a **second plurality of pair-phrases** from the **same set of words**, the second plurality of pair-phrases **different** from the first plurality of pair-phrases;
- converting, by a Baum-Welch algorithm, the first plurality of pair-phrases into a **first set** of adapted HMM word models;
- converting, by the Baum-Welch algorithm, the second plurality of pair-phrases into a **second set** of adapted HMM word models;
- **ordering** the first set of adapted HMM word models into a **first sequence**;
- **ordering** the second set of adapted HMM word models into a **second sequence**, the first sequence and the second sequence having the **same order** and the **same predetermined number of words**; and
- comparing the first and second sets of adapted HMM word models using a weighted Euclidean distance.

Basis for newly added claim 18 may be seen, for example, in FIG. 3. As shown, enrollment speech data is formed as a **first plurality of pair-phrases using a set of words**, where the set of words consists of a predetermined number of words. Pair-phrases, as shown in FIG. 3, include 96 and 74, which are formed from five words of 4, 6, 7, 9 and "ti". In a similar manner, test speech data is formed as a **second plurality of pair-phrases using the same set of words**, where the second plurality of pair-phrases is **different** from the first plurality of pair-phrases. As shown in FIG. 3, the pair-phrases of the test data include 64 and 97. These pair-phrases, which are different from the pair-phrases of the enrollment speech data, are formed, however, from the same set of words of the enrollment data, namely 4, 6, 7, 9 and "ti".

As also recited in claim 18, and shown in FIG. 3, the first plurality of pair-phrases are converted into a **first set of adapted HMM word models** and the second plurality of pair-phrases are converted into a **second set of adapted HMM word models**.

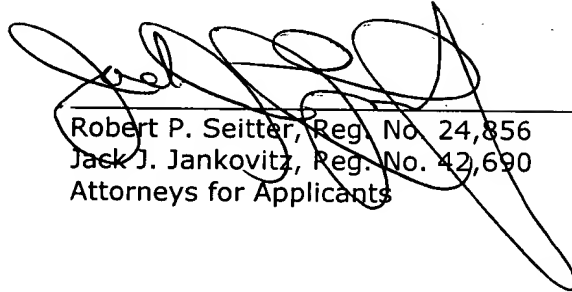
In addition, claim 18 recites that the first set of adapted word models are ordered into a **first sequence**. Similarly, the second set of adapted word models are ordered into a **second sequence**, where the first sequence and the second sequence have the **same order and the same predetermined number of words**. As shown in FIG. 3, the order of the adapted model for the enrollment data is the same as the order of the adapted model for the test data. Finally, as recited in claim 18, the first and second sets of adapted word models are compared using a weighted Euclidian distance.

The features of newly added claim 18 are not suggested by either of the cited references. Favorable consideration is requested for newly added claim 18.

Conclusion

Claims 6-9, 11-12 and 15-18 are in condition for allowance.

Respectfully submitted,



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Attachment: Figure 1 (1 sheet)

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Appln. No.: 09/660,635
Amendment Dated October 12, 2004
Reply to Office Action of July 12, 2004

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Amendments to the Drawings:

The attached sheet of drawing includes changes to Figure 1. This sheet replaces the original sheet.

Attachment